

Message Text

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ACTION SS-25

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TO SECSTATE WASHDC IMMEDIATE 3448

S E C R E T SECTION 1 OF 2 MOSCOW 15631

EXDIS

E. O. 11652: XGDS-3

TAGS: US, UR, PARM, OEXD

SUBJ: TTBT/PNE NEGOTIATIONS - MYASNIKOV PRESENTATION OF
OCT 14

REF: MOSCOW 15517

1. THIS "VERBATIM" IS THE BEST WE COULD RECONSTRUCT FROM A VERY RAPID AND POOR ORAL TRANSLATION BY THE SOVIET SIDE. IT MAY CONTAIN ERRORS UNKNOWN TO US. HOWEVER, WE ARE REASONABLY SURE THAT THE NUMBERS STATED ARE CORRECT. THE SLIDES AS SHOWN WERE IMPOSSIBLE TO READ.

QUOTE. BECAUSE THE SOVIET UNION HAS BIG NATURAL GAS DEPOSITS AND HAS GREAT NEED FOR NATURAL GAS TO DEVELOP ITS INDUSTRY, THERE IS A GREAT NEED FOR LARGE SIZE AND NUMBERS OF STORAGE CONTAINERS FOR GAS AND GAS CONDENSATE. SOVIET NATURAL GAS CONTAINS ON AN AVERAGE 200 GRAMS OF CONDENSATE PER CUBIC METER. THE DENSITY IS 0.6 - 0.8 GRAMS/CM3. IN ADDITION IT CONTAINS SOME SULPHUR, FATTY ACIDES AND NEPTHANIC FRACTIONS. BECAUSE OF THESE CHEMICALS IN THE CONDENSATE IT IS DIFFICULT TO PUMP WITHOUT PRIOR SEPARATION. DUE TO THE SULPHUR CONTENT THE NATURAL GAS AND CONDENSATE ARE HIGHLY CORROSIVE, POISONOUS, AND DIFFICULT TO STORE. STORAGE TANKS MUST BE MADE OF CORROSION RESISTANT METAL, BE ABLE TO WITHSTAND HIGH PRESSURES, AND MUST BE PROPERLY VENTED. THUS, THERE IS NEED FOR EROSION

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RESISTANT METALS IN LARGE QUANTITIES. THE CONVENTIONAL METHOD

IS EXPENSIVE, REQUIRES LOTS OF LAND, PRESENTS EXPLOSIVE AND FIRE HAZARDS AND CAN LEAD TO CONTAMINATION OF THE ATMOSPHERE.

FOR THIS REASON A METHOD FOR STORING NATURAL GAS IN UNDERGROUND CAVITIES BLASTED IN SALT BEDS BY NUCLEAR MEANS WAS DEVELOPED. RESEARCH HAS SHOWN THAT LITTLE RADIOACTIVITY REMAINS IN THE HEAVY FRACTION AND THE GAS IS NOT CONTAMINATED.

TO BE ECONOMICALLY ATTRACTIVE, SUCH STORAGE CAVITIES HAVE TO HAVE A VOLUME OF AT LEAST 50,000 CUBIC METERS, BE IMPERMEABLE AND BE ABLE TO WITHSTAND PRESSURES OF ABOUT 80 ATMOSPHERES, THE CAVITY WALLS SHOULD NOT COLLAPSE AND THE AREA MUST BE ACCESSIBLE BY CONVENTIONAL PIPE AND DRILLING EQUIPMENT AND WILL PREVENT RADIOACTIVE CONTAMINATION OF THE CONDENSATE HIGHER THAN ALLOWED STANDARDS.

SUCH UNDERGROUND STORAGE CAVITIES WERE DEVELOPED BY CAREFULLY SELECTING THE FOLLOWING PARAMETERS: OPTIMUM LOCATION, SUITABLE GEOLOGY (CLOSE TO GAS FIELDS), OPTIMUM DEPTH, SEISMIC SAFETY, PROPER DISTANCE FROM INDUSTRIAL BUILDINGS, TRANSPORTATION, PRESENCE OF UNDERGROUND WATER, ETC. DENSE SALT BEDS AT THE PROPER DEPTH WERE FOUND TO BE MOST SUITABLE FOR THIS PURPOSE.

A FORMULA AND A SCHEMATIC SKETCH OF THE DEPTH AND THICKNESS OF THE SALT LAYER AND THE RELATION OF THE SIZE OF THE CAVITY TO THESE DIMENSIONS WAS PRESENTED.

EXPERIMENTS HAVE SHOWN THAT THE FRACTURE ZONE AFTER THE BLAST HAD A DIAMETER OF NINE REPEAT NINE TIMES THE RADIUS OF THE CAVITY. IT WAS ESTIMATED THAT THE SALT BEDS WOULD HAVE TO BE SEVERAL HUNDREDS OF METERS THICK AND CONTAIN NO MORE THAN 20 PERCENT OF IMPURITIES SUCH AS GYPSUM AND ANHYDRITE. THE SALT WOULD HAVE TO BE FIRM ENOUGH TO WITHSTAND THE PRESSURE OF GAS AND NOT TO COLLAPSE OR DEFORM UNDER LITHOSTATIC PRESSURE. THE NUMBERS GIVEN FOR THE DESIRED COMPRESSIVE STRENGTH OF THE SALT WAS 200 KILOGRAMS PER SQUARE CENTIMETER.

THE CASING OF THE DRILL HOLE WAS CEMENTED AND MORE CEMENT
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WAS INJECTED NEXT TO IT TO PROVIDE A GOOD SEAL. (NOTE: NOT CLEAR WHETHER CEMENT WAS INJECTED ONLY AROUND THE CASING OR WHETHER IT WAS ALSO FORCED IN ALONG THE BEDDING PLANES.)

TO PROVIDE FOR SEISMIC SAFETY THE FOLLOWING FIGURES WERE GIVEN. THE GROUND MOTION (DISPLACEMENT VELOCITY) FOR BRICK STRUCTURES WOULD BE 2 CENTIMETERS PER SECOND, FOR STEEL FRAME INDUSTRIAL BUILDINGS -- 10 CM. PER SECOND, AND FOR REINFORCED

CONCRETE BUILDINGS, 40 CM.PER SECOND. FORMULAS WERE GIVEN FOR THESE CALCULATIONS:

SURFACE OBJECTS: "U" EQUALS "K" TIMES PAREN "G" RAISED TO ONE THIRD POWER DIVIDED BY "R" CLOSED PAREN QUANTITY RAISED TO "N" POWER.

FOR UNDERGROUND OBJECTS: "U" SUB "MX" EQUALS 10.8 TIMES PAREN "G" RAISED TO ONE THIRD POWER DIVIDED BY "10R1 CLOSED PAREN QUANTITY RAISED TO 1.38 POWER.

WHERE "K" HAS VALUES FROM 40 TO 60 "N" HAS VALUES FROM 16 TO 18.

INDUSTRIAL AND INHABITED AREAS SHOULD BE TAKEN INTO ACCOUNT. PNES SHOULD BE GUARANTEED TO HAVE A SMALL DEVIATION FROM THE NOMINAL YIELD.

IN THE GEOLOGIC SECTION OF THE AREA SELECTED THE SALT BEDS EXTEND FROM 750 METERS TO 1800 METERS IN DEPTH. THE LOCATION OR THE YIELD OF THE SHOT WERE NOT GIVEN. (WHEN ASKED ABOUT THE DEPTH OF THE CAVITY, AFTER SOME HESITATION HE WROTE WITHOUT SAYING A WORD THE FIGURE OF 1140 METERS.) THE EXPERIMENT WAS LOCATED AT A GAS CONDENSATE AREA TAKING THE ABOVE CIRCUMSTANCES INTO ACCOUNT.

THE VOLUME OF THE CAVITY MEASURED BY DRILLING AND GEOPHYSICAL METHODS WAS SAID TO CORRESPOND TO INITIAL CALCULATIONS. THE CAVITY WAS LEFT FOR A FEW MONTHS TO COOL OFF. WHEN FIRST TAPPED THE TEMPERATURE WAS 120 DEGREES CENTIGRADE AND THE PRESSURE WAS 5 ATMOSPHERES.

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THERE WAS NO CONTAMINATION AND THE SEALING WAS AIR TIGHT. THERE WAS NO WATER IN THE HOLE AND THE VOLUME WAS APPROXIMATELY 50,000 CUBIC METERS. FOUR MILLION CUBIC METERS OF GAS WERE PUMPED INTO THE CAVITY AT A PRESSURE OF 84 ATMOSPHERES. THE TEMPERATURE AT FIRST WAS 118 DEGREES CENTIGRADE. AFTER 30 DAYS THE PRESSURE DECLINED TO 80 ATMOSPHERES AS GAS BEGAN TO FILL THE FISSURED ZONE. LATER MORE AIR WAS PUMPED IN AND THE PRESSURE WAS STABILIZED AT 84 ATMOSPHERES. ANALYSIS SHOWED THAT CAVITY VOLUME INCREASED SLIGHTLY WITH HIGHER PRESSURES. THE INCREASE WAS 28 PERCENT AT 84 ATMOSPHERES. THE RADIOACTIVITY CHECK GAVE READINGS WHICH WERE BELOW THE NORM AND NO GAS LEAKAGE WAS DETECTED. A CONVENTIONAL WELL CAP, PIPING AND DISTRIBUTING SYSTEM WAS USED TO EXTRACT THE GAS FROM THE WELL WHICH, BECAUSE OF THE HIGH PRESSURE, REQUIRED NO PUMPING. THERE WAS A GAS LINE NEARBY WHICH COULD BE USED FOR TRANSPORTING THE CONDENSATE TO THE PROCESSING PLANT.

THE ADVANTAGES QUOTED WERE AS FOLLOWS: TEN TIMES LESS METAL FOR THE SAME AMOUNT OF GAS STORAGE, 2000 TIMES SMALLER SURFACE AREA REQUIRED, AND THE CONSTRUCTION TIME REQUIRED WAS SEVERAL TIMES LESS THAN FOR CONVENTIONAL MEANS.

THIS METHOD IS ALSO CHEAPER THAN SOLUTION MINING OF CAVITIES AND HAS A MORE UNIVERSAL APPLICATION.

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THIS METHOD HAS NOT YET BEEN PERFECTED AND REQUIRES FURTHER DEVELOPMENT TO OBTAIN HIGHER PRESSURES, HYDROSTATIC AND LITHOSTATIC, TO STORE AND RETRIEVE GAS WITHOUT ADDITIONAL PUMPS. SHORTER CONSTRUCTION TIME IS ONE OF THE GOALS WHICH MIGHT BE ACHIEVED BY WATER COOLING OF THE CAVITY AFTER THE EXPLOSION. IT IS ALSO PLANNED TO CONTRUCT SUCH CAVITIES BEFORE ERECTING ANY BUILDINGS AND INDUSTRIAL COMPLEXES IN ITS VICINITY TO MINIMIZE THE SEISMIC EFFECT.

COMMENTS: GRAPHS WERE SHOWN OF THE STRATAGRAPHIC COLUMN OF THE AREA, GAS TEMPERATURE VERSUS TIME, AND PERCENT VOLUME INCREASE VERSUS PRESSURE. SLIDES WITH A GENERAL VIEW OF THE AREA WERE PROJECTED SHOWING FLAT GRASSY LANDSCAPE WITH CONVENTIONAL LOOKING WELLHEADS AND PIPING. ONE SLIDE SHOWED GAS BEING BURNED OFF BECAUSE THE CAVITY WAS OVER FILLED. END COMMENT.

THANK YOU. END QUOTE.

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